

STATEMENT OF DR. GEORGE DONOHUE, ASSOCIATE ADMINISTRATOR FOR
RESEARCH AND ACQUISITIONS, FEDERAL AVIATION ADMINISTRATION,
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND
INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, ON THE WIDE AREA
AUGMENTATION SYSTEM FOR THE GLOBAL POSITIONING SYSTEM.
NOVEMBER 30, 1995.

Mr. Chairman and Members of the Subcommittee:

I welcome the opportunity to appear before you today to report on FAA's progress on the Wide Area Augmentation System for the Global Positioning System. Joining me is Dick Arnold, Integrated Product Team Lead for GPS and Navigation.

The Global Positioning System, or GPS, offers the greatest opportunities for improvement in air traffic management since the introduction of radar over forty years ago. In the very near future, use of GPS will revolutionize the way aviation -- and the way the Federal Aviation Administration (FAA) -- does business. Pilots will be able to fly more direct routes to their destinations, without being confined to limited flight paths. The aviation industry has estimated that by 2005 U.S. carriers will save 500 million dollars annually in fuel costs alone through more flexible and efficient routing; GPS will be a major factor in achieving these savings. Delays will also be reduced, which benefits everyone's bottom line, passengers as well as airlines. In addition, the taxpayers will save more than 200 million dollars annually when we decommission today's ground-based navigational aids. All of this will be achieved while simultaneously enhancing safety for all users of the air traffic control system, from the private pilot to the major air carriers.

GPS, which the Department of Defense (DOD) developed and operates, is already in limited use for civil aviation. The System is a network of 24 satellites that constantly orbit the earth transmitting radio signals that can be used for navigational purposes.

Private pilots, using a small receiver in the aircraft, can use the signals put out by the GPS satellites as a supplemental means of navigation to determine their location within 100 meters. Commercial airlines now use GPS as a sole means of navigation for oceanic routes, where separation standards are greater than over land.

In addition to its use in aviation, GPS has wide and rapidly growing use for other civilian applications. These include surveying, oil exploration, agriculture, trucking, commercial and recreational boating, railroads and automobile location and navigation. In the maritime industry, GPS currently provides safety and efficiency benefits similar to those that will soon be realized in aviation. It has been estimated that within a decade aviation's use of GPS will represent less than 10 percent of all civil use.

DOD provides an accurate encrypted signal for military use only. As one way to prevent unauthorized use of the civil system for precision weapon guidance, the Department of Defense uses a feature known as selective availability. Selective availability is an intentional degradation in GPS navigation and timing accuracy that DOD creates by varying the precise time of the clocks on board satellites that broadcast signals to GPS receivers. With selective availability, the civilian signal is accurate only to within 100 meters.

Although GPS is already providing useful aviation services, the system as it exists today is not able to provide the integrity, availability and accuracy necessary if it is to serve as the primary means of aircraft navigation and landing guidance, so that it can replace current ground-based systems. After comparing the technical performance and cost-benefit of a number of alternatives, the FAA chose the Wide Area Augmentation System, or WAAS, as the means of meeting aviation's needs. WAAS is a network of approximately 35 ground stations that will receive, analyze and refine signals from the

GPS satellites and transmit the information via communication satellites to all aircraft flying within U.S. airspace. We have developed a National Test Bed on which we have tested the entire WAAS concept.

FAA awarded the WAAS contract to a team led by Wilcox Electric in August of this year, with the Department of Defense's support to proceed with the contract. Before entering into that contract, we discussed at length with the Department of Defense any potential national security issues concerning development of WAAS. Certain issues were identified and processes for resolving the issues were agreed to. Those processes are now under way.

You may have read recently that there was some question about this agreement. Without getting into details, I would like to say that some information reported by the press was misleading. The Department of Transportation and the FAA are participating with a number of other federal departments and agencies in a process, led by the Office of Science and Technology Policy and the National Security Council, to develop national policy on the future management and use of GPS. An integral component of this process has been a review and assessment of national security, economic, and foreign policy issues. This interagency process is nearing completion and we expect that the Administration will announce the results in the near future.

This Committee has made clear to us its concern that the WAAS contract be brought in on time and within budget. We share your concern, and are doing everything we can to make sure that happens. As Associate Administrator for Research and Acquisitions, I have made fundamental changes throughout my organization to ensure that we manage all contracts better, and that my top management is informed of even minor schedule slippages or cost overruns so that they do not become major problems.

There are a number of significant differences between this contract with Wilcox and previous procurements. First, the WAAS contract is for a clearly-defined product. The prototype system is being operated currently -- we are not relying on the contract for basic system design. We knew from the start the system parameters we needed, and we have the expertise in-house to ensure the contractor's compliance.

Second, we are managing the contract better. Since we know what we need, we are in a better position to hold Wilcox to the schedule stated in the contract. One way we are doing this is by supervising Wilcox's performance more closely. FAA employees have been detailed to work with Wilcox on a day-to-day basis. This ensures that we get complete and up-to-date reports from our own people, who will give us an early warning of any possible problems. Finally, we drafted the contract to provide financial incentives for Wilcox to meet its milestones. If they miss these milestones, they will not receive significant incentive payments, which would reduce -- and possibly eliminate -- their profit on the contract. Although we have set an ambitious schedule for completion of the WAAS contract, I am confident that it can be achieved.

We expect work on the first phase of the WAAS contract to be completed by early 1998. At that point, WAAS will be available as a primary means of navigation for en route through non-precision approaches, providing position information that is accurate within less than ten meters. In addition to overseeing the WAAS contract, we are developing the instrument approach procedures that will be necessary for aircraft to use WAAS in order to land at U.S. airports. Approach procedures, which were developed for the current ground-based navigational system, have to be revised for GPS. That process is now well under way, and we expect it to be completed by the time WAAS is fully commissioned for Category I precision approaches in 2001. (Category I precision

approaches allow the aircraft to land if the cloud height is at least 200 feet above the airport surface and the visibility is at least one-half mile.) This capability will give the public considerably better and safer access to more airports. Today, fewer than 1,000 airports have the instrument landing systems which permit approaches in very low-visibility conditions. GPS and WAAS will permit such instrument approaches to every airport within the U.S., as necessary.

The accuracy of WAAS is adequate to support Category I approaches, but greater accuracy is required for Category II and III approaches, the latter allowing completely automatic landing (meaning that the pilot does not need to touch the controls until the plane is on the runway), with no ceiling requirement and only enough visibility to taxi after the plane is on the runway. To achieve these higher levels of accuracy, the FAA is developing the Local Area Augmentation System, or LAAS. We are currently studying prototypes for this system, which would be located at airports. Our current plans call for making the required technical decisions on the local augmentation system by 1998. When the local system is defined, and the necessary approach procedures have been developed, GPS will be available for category II and III precision approaches.

We project that for a limited time, while the GPS system is being phased in, it would be prudent to maintain the conventional ground-based navigational system. It will also be necessary to give the aircraft operators, airlines, general aviation and military adequate time to reequip their fleets. The issue of whether backup navigation systems will be required is under study, and will not be finally resolved until there has been substantial operational experience with GPS. We will work closely with the International Civil Aviation Organization, ICAO, in reaching a conclusion on this issue.

Like the current ground-based navigational system, the satellite-based system will be constantly monitored, and will have multiple redundancies in case elements of the system are unavailable for any reason. WAAS will monitor GPS signals for possible anomalies, and provide timely warning should a malfunction occur. Some members of the Committee have raised questions about the security of the GPS - WAAS system. Unfortunately, it would be impossible to develop a navigational system absolutely impervious to tampering or sabotage, no matter whether the system is ground-based or satellite-based. Even an encrypted system can be interfered with. We are confident, however, that with its monitoring capabilities and backup systems, the GPS - WAAS system will be at least as secure as the current system.

With GPS and WAAS, the FAA is moving navigation technology into the twenty-first century. We are poised to take full advantage of the great advances in safety, efficiency and economy offered by satellite-based technology. That concludes my prepared statement, and I would be pleased to respond to any questions you may have at this time.